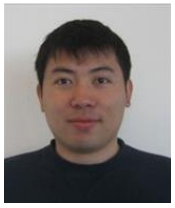
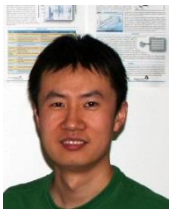
Syllabus

CS 553
Cloud Computing
http://www.cs.iit.edu/~iraicu/teaching/CS553-S13/index.html

Semester: Spring 2013
Lecture Time: Monday/Wednesday, 11:25AM - 12:40PM
Location: Life Sciences Building 111


Professor:

- **Dr. Ioan Raicu** (iraicu@cs.iit.edu, 1-312-567-5704)
  - Office Hours Time: Wednesday 12:40PM-1:40PM (SB237D)

Teaching Assistants:

- **Dongfang Zhao** (dzhao8@hawk.iit.edu)
  - Office Hours Time: Tuesday/Thursday 2PM-3PM (SB237D)
- **Tonglin Li** (tli13@iit.edu)
  - Office Hours Time: Thursday 10AM-11AM, Friday 12:45PM-1:45PM (SB003b)
- **Iman Sadooghi** (isadoogh@iit.edu)
  - Office Hours Time: Monday/Tuesday 12:45PM-1:45PM (SB003b)

Office Hours Summary:

- **Monday:** 12:45PM-1:45PM (Sadooghi SB003b)
- **Tuesday:** 12:45PM-1:45PM (Sadooghi SB003b), 2PM-3PM (Zhao SB019c)
- **Wednesday:** 12:45PM-1:45PM (Raicu SB237D)
- **Thursday:** 10AM-11AM (Li SB003b), 2PM-3PM (Zhao SB019c)
- **Friday:** 12:45PM-1:45PM (Li SB003b)

Course Description

Cloud Computing is "A large-scale distributed computing paradigm that is driven by economies of scale, in which a pool of abstracted, virtualized, dynamically-scalable, managed computing power, storage, platforms, and services are delivered on demand to external customers over the Internet." It has become a driving force for information technology over the past several years, and it is hinting at a future in which we won't compute on local computers, but on centralized facilities operated by third-party compute and storage utilities. Governments, research institutes, and industry leaders are rushing to adopt Cloud Computing to solve their ever-increasing computing and storage problems arising in the Internet Age. There are three main factors contributing to the surge and interests in Cloud Computing: 1) rapid decrease in hardware cost and increase in computing power and storage capacity, and the advent of multi-core architecture and modern supercomputers consisting of hundreds of thousands of cores; 2) the exponentially growing data size in scientific instrumentation/simulation and Internet publishing and archiving; and 3) the wide-spread adoption of Services Computing and Web 2.0 applications. This course is a tour through various topics and technologies related to Cloud Computing. Topics include distributed system models and enabling technologies, computer clusters for scalable Computing, virtual machines and virtualization of clusters and datacenters, design of cloud computing platforms, cloud programming and software environments (Workflow Systems, MapReduce, Google App Engine, Amazon AWS, Microsoft Azure, and emerging cloud software stacks), grid computing and resource management, P2P computing with overlay networks, ubiquitous computing with clouds and the Internet of things, and data-intensive distributed computing. The course involves lectures, homeworks, programming assignments, and exams. Prerequsites: CS450 or CS455.

Required Texts

We will be using the textbook Distributed and Cloud Computing: Clusters, Grids, Clouds, and the Future Internet by Kai Hwang, Jack Dongarra & Geoffrey C. Fox. (Required)

Prerequisites

CS450 (Operating Systems) or CS455 (Data Communications). Other courses that might contribute to having a better in depth understanding of this course are CS542, CS546, CS495 (Introduction to Distributed Computing), CS550, CS551, CS570, and CS554; these courses are not required. Many of these graduate courses (including the CS553 course) are part of the Master of Computer Science Specialization in Distributed and Cloud Computing.

Detailed Course Topics

Lecture topics:

- Distributed System Models
- Parallel Computing
- Virtualization
- Cloud Platform Architectures
    - Amazon AWS
    - Microsoft Azure
    - Google App Engine
    - Google MapReduce / Yahoo Hadoop
    - Eucalyptus, Nimbus, OpenStack
- Service-Oriented Architectures
- Cloud Programming
- Grid Computing
- Peer-to-Peer Computing

Programming Assignments

There will be 4 programming assignments throughout the semester, each worth 10% of the total grade, and each taking about 4 weeks to complete. These assignments will be completed in teams of 2 students. The projects will require knowledge of Java, C and/or C++. It is expected that students know the basics of these languages. These assignments must be submitted through BlackBoard.

Written Assignments

There will be 6 written assignments throughout the semester, each worth 4% of the total grade, and each taking about 3 weeks to complete. These assignments will be completed individually. These assignments must be submitted through BlackBoard.

Late Policy

Assignments will be due at 11:59PM on the day of the due date, through BlackBoard. There will be a 15 minute grace period. There will also be a 7-day late pass, where students can submit late assignments without penalty; the late pass can be used in 1-day increments spread out over multiple assignments. Any late submissions beyond the grace period and beyond the 7-day late pass, will be penalized 10% every day it is late.

Exams

There will be 2 exams, one covering the material from the first half of the class, and the second covering the material from the second half. The exams will be individual, but students will be allowed to use their textbooks and any notes they have (on paper). No electronic devices such as phones, eReaders, tables, or laptops will be allowed. Simple calculators can be used. Each exam will be worth 18% of the overall grade.

The exams are scheduled on:

- **Wednesday, March 13th, 2013 from 11:25AM - 1:05PM in Life Science 111**
- **Wednesday, May 1st, 2013 from 11:25AM - 1:05PM in Life Science 111**

Please note that they extend for 25 minutes after the usual end of class, but this should not interfere with anyone's other classes due to the lunch period.

There will be no makeup exams.

Grades

Grading Policies:

- Written Homeworks (6): 24%
- Programming Assignments (4): 40%
- Exam (2): 36%

The following grading scale will be used. The scale will be adjusted downwards based on the overall performance of the entire class. Traditionally, in my classes, the class average score will typically fall in the B-grade range.

- **A: 90% ~ 100%**
- **B: 80% ~ 89%**
- **C: 70% ~ 79%**
- **D: 60% ~ 69%**
- **E: 0% ~ 59%**

Mailing lists

There is a course mailing list, please use it for as much of the communication as possible regarding questions on the written and programming assignments. Students are encouraged to participate in discussions by answering other student's questions. You can send mail to the list by sending email to cs553-s13@datasys.cs.iit.edu. The email you have on BlackBoard has already been added to the mailing list (on January 14th, 2013). You can remove this email and/or add other emails by visiting http://datasys.cs.iit.edu/mailman/listinfo/cs553-s13.